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Health and Environmental Risk Communication in Thailand: An Analysis of Agency Staff's Perspectives on Risk Communication With External Stakeholders

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Health and environmental agencies are routinely called upon to provide risk-related information to the public-at-large and to more narrowly defined audiences, such as children, pregnant women, or labourers. While a large body of guidance is available, it is often general and transferability to new contexts is not well understood. In particular, the relevance of this guidance for South-East Asia is not clear. This paper reports the results of a study, using Q method, that aimed to develop a better understanding of officers' and staff's perspectives on health and environmental risk communication within a single regulatory agency in Thailand, the Pollution Control Department. The results demonstrate that there are multiple perspectives, and they are unrelated to roles or experience. This study contributes to a deeper understanding of the ways that officers and staff within a national agency with important responsibilities for health and environmental risk communication in Thailand think about these responsibilities and how to achieve them.

Keywords: Risk Management; Health Communication; Organisational Studies; Q Method; Thailand

Gesundheits- und Umweltbehörden erfüllen üblicherweise die Rolle der allgemeinen Öffentlichkeit, aber auch speziellen Zielgruppen wie Kindern, Schwangeren oder ArbeiterInnen, risikobasierte Informationen zur Verfügung zu stellen. Trotz vorhandener Beratung ist diese oft sehr allgemein gehalten und eine Übertragbarkeit auf neue Kontexte ist schwierig. Besonders die Relevanz der Beratung in Bezug auf Südostasien ist oft unklar. Dieser Artikel berichtet über die Ergebnisse einer auf der Q-Methode basierenden Studie, die versucht, ein besseres Verständnis über die Perspektiven von Führungskräften und MitarbeiterInnen in Bezug auf Gesundheits- und Umweltrisikokommunikation innerhalb der thailändischen Behörde für Umweltschutz zu gewinnen. Die Ergebnisse zeigen, dass es, unabhängig von den Rollen und Erfahrungen der Befragten, sehr unterschiedliche Perspektiven über Verantwortlichkeiten gibt. Die Studie gibt einen Einblick in diese Perspektiven und die Möglichkeiten der Umsetzung in einer verantwortungsvollen nationalen Behörde im Bereich Gesundheits- und Umweltrisikokommunikation.

Keywords: Risikomanagement; Gesundheitskommunikation; Organisationstheorie; Q-Methode; Thailand

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Introduction⁵

A critical task of health and environmental agencies is to communicate information about health risks. “Risk communication” refers to activities that provide information to an audience about the risks (and benefits) of a particular activity or technology, and it is widely understood as an important function of government agencies at all levels (Kasperson & Stallen, 1991; Morgan, Fischhoff, & Bostrom, 2001; Renn, 1992; USFDA, 2011; USNRC, 1989). The audience of communication efforts can be the general public, targeted subgroups within a population, such as labourers or particularly vulnerable subgroups, or institutions. The task of risk communication may serve the purpose of informing people of options. For example, a community may be considering how to promote economic development through different industrial and agricultural activities; each will have a different mix of risks and benefits. A second purpose can be to persuade people to adopt particular behaviours, such as using condoms, reducing the use of pesticides in agricultural work, or stopping smoking. Risk communication is also used to build consensus around policy proposals, to disseminate information during a crisis, and to promote trust in hazard and health management agencies.

National government agencies in Thailand are routinely called upon to provide risk-related information to the public-at-large and to more narrowly defined audiences, such as children, pregnant women, or agricultural labourers. Information is provided about, for example, ways to prevent insect-borne viruses (e.g. dengue fever or malaria) (Academy for Educational Development, 2010; Heddini, 2009) and sexually transmitted diseases (Chamrathirong & Boonchalaksi, 2009; Rao, 1998), how to reduce exposure to toxic chemicals (Regional Forum, 2009), the use of helmets among motorcycle riders (Ichikawa, Chadbunchachai, & Marui, 2003), and the dangers of smoking (Svenkerud & Singhal, 1998; Takeuchi, 2006). Labourers are also the subject of informational campaigns about, for example, exposures to chemical releases (Langkulsen, Vichit-Vadakan, & Taptagaporn, 2011), best practices for reducing exposures to pesticides (Bumbudsanpharoke, Moran, & Hall, 2009; Chalermphol & Shivakoti, 2009) and the

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effects of heat stress (Langkulsen, 2011; Langkulsen, Vichit-Vadakan, & Taptagaporn, 2011; Tawatsupa et al., 2010). During the recent floods, the Ministry of Environment and Natural Resources, the Ministry of Public Health, and the Disaster Warning Centre provided information about exposure to contaminated foods and water, electrocution hazards, and drownings. Constitutionally required health impact assessments require that regulatory agencies consider public health risks associated with new industrial facilities (Jindawatthana, Sukkumnoed, Pengkam, Chuenchit, & Mathurapote, 2009; Phoolcharoen, Sukkumnoed, & Kessomboom, 2003).

The effective communication of information about health and environmental risks is not easy. A vast literature provides guidance, but insights are often difficult to generalise. Simplistic principles and checklists, like ‘understand the needs of the community’, may be difficult to achieve in practice and do not provide clear guidance in specific situations. What is understood to be the best practice in a particular situation will depend on what those organising and participating in the process think about the context, the objectives, their roles, the scientific understanding of the issues, and many other factors. Yet, this body of work does provide “enough evidence and experience to make good guesses at best general practices for communicating useful informative messages to help the public make informed decisions about their health” (USFDA, 2011, p. 107).

However, this is a statement applicable to the state of knowledge in the US and Europe. The relevance of this evidence and experience for South-East Asia is not clear. Despite a rapid growth in risk communication research and practice, little work has been grounded in the socio-cultural context of Thailand or elsewhere in South-East Asia. The implications for cultural preferences of, for example, saving face and avoiding conflict remain largely unexplored in the field of risk (and crisis) communication. Making good guesses by applying relevant knowledge and experience in the South-East Asian context suggests that health and environment agencies need to take a close look at their capacities and responsibilities, staff’s understandings of roles, responsibilities, and priorities for communication efforts, and some kinds of assumptions that are made about the audiences of health communication efforts.

This paper contributes to our understanding of institutions responsible for health and environmental risk communication in Thailand. We report the results of a study investigating the perspectives of officers and staff about risk communication within a

single regulatory agency in Thailand, the Pollution Control Department. Our objectives were to understand (a) perspectives about risk communication needs, goals, organisational capacities, target audiences, and content of communication activities and (b) the degree to which perspectives varied by department, position in the organisational hierarchy, and depth of experience with risk communication. We focus on the views of agency officers and staff because formal rules and procedures for risk communication are not well developed within Thai government agencies. Thus, we expect to find a range of viewpoints based on how different individuals “understand their location, the norms that affect them and their interests” (Bevir & Rhodes, 2006, p. 6; Krueger & Gibbs, 2010): a combination of national and organisational cultures, organisational traditions, and personal beliefs and preferences. The next section of the paper describes our research methods, which employed *Q method* as the primary analytic approach, and a brief overview of the Thai Pollution Control Department. After discussing the results, which include the presentation of different perspectives among PCD officers about the purposes and methods of risk communication, we discuss the relevance to the practice of risk communication in the South-East Asian context.

Research Method

This study used *Q method*, a quantitative way for gathering information from a small group of people in structured interviews (Brown, 1996; Tuler & Webler, 2008). *Q method* has been applied to the study of a variety of issues related to environmental management, political ideologies, people’s perceptions of animals and nature, pedagogy, personal relationships, and medical care as well as risk communication and public participation (Bumbudsanpharoke et al., 2009; Chess & Johnson, 2006; Kalof, 1998; Niemeyer, Petts, & Hobson, 2005; Tuler, Webler, & Finson, 2005). The goal of *Q method* is to reveal the range of viewpoints on a topic (such as the importance of external communications with the public and goals of risk communication) by asking different people to rank-order a group of ‘*Q statements*’ in response to a sorting instruction that sets the context. This is known as ‘doing a *Q sort*’.

Determining the right number of *Q* participants means finding the right balance between two competing rules of thumb. On the one hand, it is good to have a certain

amount of redundancy among the Q participants. Normally a Q study will result in two to five shared perspectives as this is generally the number of distinct perspectives about any issue under consideration. For each perspective, it is ideal to have two to five individuals who 'define' it. According to this rule, the number of Q participants should be between 4 (2 factors x 2 people defining each factor) and 25 (5 factors x 5 people defining each factor). On the other hand, it is important to have fewer Q participants than Q statements.

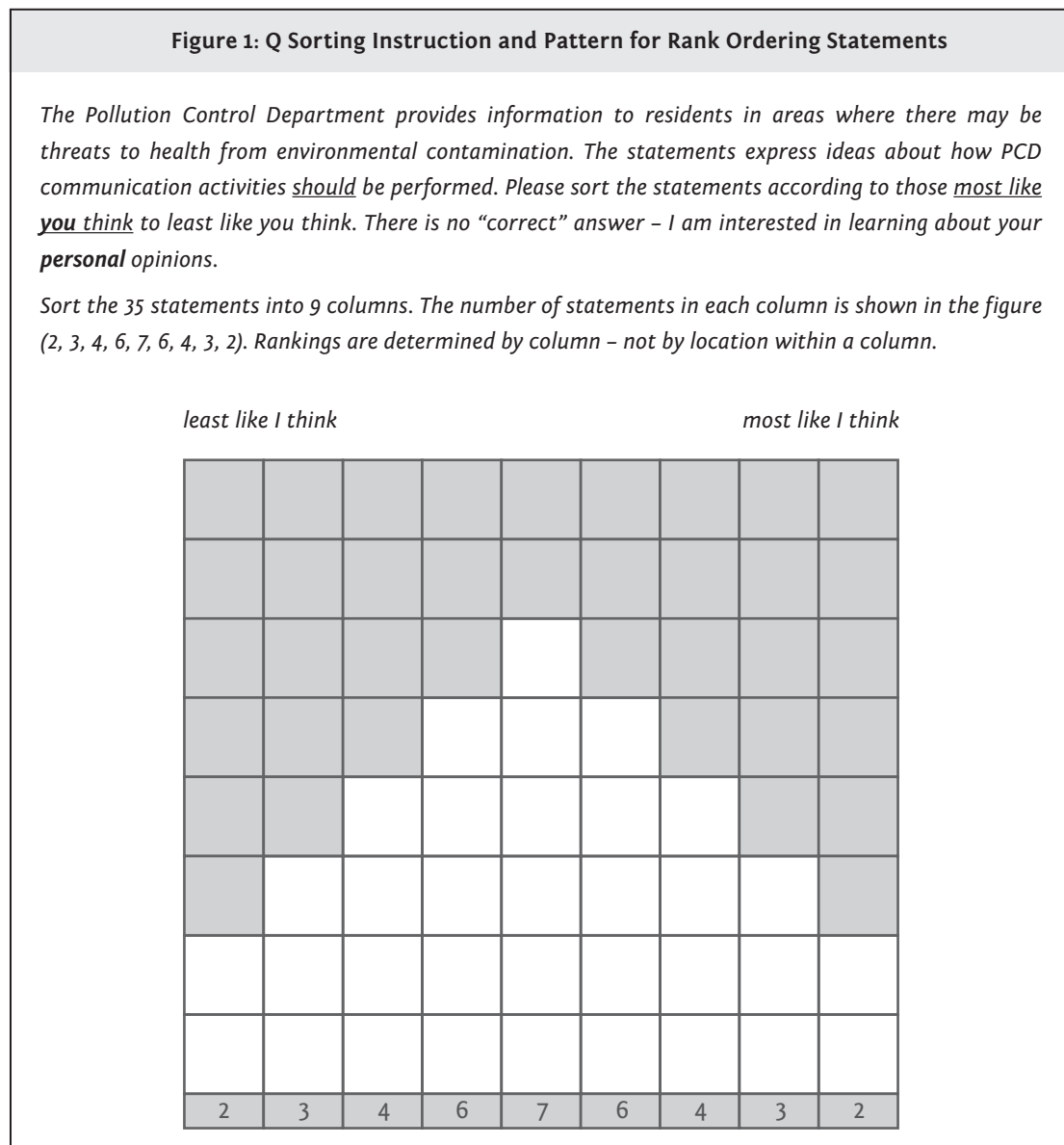
The context for our study was the Pollution Control Department (PCD) of Thailand. The PCD was established in 1992 and is part of the Ministry of Environment and Natural Resources. The mission of the PCD is to control, prevent, reduce, and eliminate pollution as well as to conserve and rehabilitate the environment conducive for human life in Thailand. Its responsibilities require that the department develop and provide information about pollution sources, health risks, and hazard management within Thai society. It is organised into three bureaus: Air Quality and Noise Management, Water Quality Management, and Waste and Hazardous Substance Management.

Data for this study were gathered during September and October 2009 from 28 officers and staff working in the three bureaus of PCD: Air Quality and Noise Management (12 individuals), Water Quality Management (9 individuals), and Waste and Hazardous Substance Management (7 individuals). Officers from different organisational levels were interviewed, including bureau directors, operational officers, experts, special experts, and managers. These were categorised as senior level officers (8 individuals), middle level officers (13 individuals), and junior level officers (7 individuals, including one administrative officer). With the input of PCD managers we tried to select individuals with a range of a) experience with risk communication activities and b) responsibility for managing or implementing risk communication activities. The reason we selected people from the three bureaus was to investigate if there were different viewpoints about communication activities or if there was agreement about communication goals and objectives across the bureaus. This is also why we gathered data from individuals at different levels (senior officer, staff and so forth).

A key to any Q study is the sample of statements that respondents are asked to sort. These must represent all key aspects of likely perspectives on the issue of interest. Typically, 20 to 60 statements are selected to make up the Q sample. In this study, the Q statements were based on a review of scholarly literature on risk communica-

tion. Feedback about the relevance of possible statements was obtained from our Thai collaborators and contacts at the PCD. Ultimately, 35 statements were chosen and they are shown in Table 1.

In this study, the sorting instruction and the statements were developed in English and translated into Thai. Individuals completing Q sorts were asked to rank-order the statements according to a particular pattern. Both the sorting instruction and the pattern for rank-ordering statements are shown in Figure 1. The numbers in the bottom row refer to the number of statements that can be placed in each column. We asked each participant to read all the statements once. Then we asked them to sort the statements into three piles, the left-hand pile being the statements they



Source: Authors' Questionnaire

would least likely emphasise as important, the right-most pile being those they would most likely emphasise as important, and the middle pile being somewhere in between. They then continued by sorting the cards into a normal distribution as shown in Figure 1. Two cards could be placed in the left-most columns, three in the second-most left column, and so on. The scale was ordinal with the two endpoints subjectively anchored. In other words, a certain participant may have felt that *all* the statements were important, but he or she still had to differentiate between those that he or she would be *most unlikely* and *most likely* to emphasise. While this technique (like surveys) forces participants to provide information in a manner structured by the researcher, unlike surveys items are ranked relative to each other. The participants are also free to define their own scale, such as at what point statements move from being important to neutral in relative ranking. For example, someone could have defined the rightmost seven columns as statements considered *likely* or *most likely* and relegate only the leftmost two columns as objectives *unlikely* to emphasise. Moreover, objectives may be grouped by some underlying concepts rather than strictly rank-ordered. Participants can structure their rank-ordering of statements in a manner that makes sense to them. We sought to gather information about such issues by asking the participants to reflect on the pattern of cards they created.

After all the data were gathered, correlations among individuals' Q sorts were computed and factor analysed. In this study, three factors were identified. The factors are defined by an 'idealised' rank-ordering of the statements that best describes the individual sorts included in the factor. Thus, each factor can be described as its own Q sort, as shown by the data in Table 1. Based on these factors, three short narrative descriptions were written. They represent perspectives about how personnel view the risk communication activities with external stakeholders, the role of PCD, and the organisational issues the agency confronts. These descriptions were then shared with 12 people who participated in the study. Typically they were the individuals who loaded most highly on each factor. This allowed us to validate the accuracy of the descriptions of the perspectives. We received written feedback from 7 individuals. Based on feedback from these individuals we modified the narrative descriptions.

Q method is both similar and dissimilar to a survey. Like a survey, Q method is a technique to explore peoples' subjective beliefs and attitudes. As in a survey, people

react to statements by assigning them to categories according to extent of agreement or disagreement. However, Q method is unlike a survey by allowing participants far more flexibility to express their beliefs. It also forces people to express how strongly they believe something – they cannot say everything is important. In addition, they prioritise the statements relative to each other. In surveys each item is ranked independently of the others on a pre-defined scale. It is these features of Q that make it an important way to understand differences between people's viewpoints. Once the sorts have been entered into a computer, factor analysis is used to reveal the viewpoints within the population studied and patterns of similarities and differences.

In the following section we present the narrative descriptions that represent the three factors. Then, we go on to compare them.

Results

Three distinct and coherent factors – or what we will call perspectives on risk communication – emerged from the analysis. Information about the rankings for each statement in the three factors is provided in Table 1. These three factors explain 45 percent of the variance, which is considerable for a Q study.

Table 1: Q Statements and Their Rankings in Each of the Three Factors*				
	FACTOR	A	B	C
1. The PCD and local communities should work together to solve environmental problems in the local areas.		1	1	4
2. The PCD's communication with local communities should be based on the assumption that local people do not understand pollution and risk problems.		-4	-2	-1
3. The PCD communication efforts should help reduce conflicts.		2	-2	-1
4. The PCD should educate people about environmental threats to health.		0	-4	3
5. The PCD should listen carefully to what people worry about.		4	-1	1
6. Communication activities should help the PCD's officials understand what local people know.		1	2	1
7. The PCD should give people all the information they want.		-2	-4	-3
8. Communications should correct misunderstandings based on misinformation or lack of knowledge.		0	2	4
9. The PCD should only communicate about what is required by law and regulation.		-4	1	-4

10. The PCD should inform the local community residents about what they're doing and why they're doing it.	-2	1	3
11. The PCD should explain what is being done by government and industry to manage environmental health problems.	-3	-2	0
12. Government agencies and private organisations should coordinate the information given to communities in order not to confuse them.	2	4	1
13. The PCD communications should be tailored to the specific local situation.	1	2	2
14. The PCD should respond in a timely way to all questions, comments, and requests.	0	-1	2
15. The PCD should tell people how to protect themselves from pollution problems.	0	-1	3
16. The PCD managers should make communication with the community an important priority.	3	0	2
17. Communication activities should mobilise communities to demand better pollution controls and reduction.	-3	-3	-1
18. The PCD staff should learn to communicate better with community residents.	4	-1	0
19. The PCD should gather information from the public that will help scientists and regulators do a better job.	-1	0	-2
20. The PCD should explain information about pollution and risk by comparing levels to standards.	0	2	0
21. Communication activities should target vulnerable groups.	-1	0	0
22. The PCD should be very careful not to give the impression that it is taking sides in disputes.	3	1	2
23. Information provided to the public should be based on the best available science.	2	4	-1
24. The PCD needs to help local community leaders understand the science behind pollution control and mitigation activities.	-1	3	0
25. The PCD should help people understand the limits and uncertainties of what is known about health risks.	-2	0	0
26. The information given to people should focus on the most important risks they face.	-2	0	1
27. The PCD's communication efforts should build trust with local communities.	1	1	-2
28. The PCD's communication efforts should inform the agency's preventative measures to manage pollution problems in local areas.	-1	0	0
29. The PCD should focus on local leaders, rather than the whole community when it gives out information or asks for input.	-3	-3	-4
30. A commitment to programmes should be made that help PCD officers communicate better with each other.	2	0	-2
31. PCD should invest the time, money, and staff needed for successful communication with the public.	3	-1	-3
32. The PCD should have more scientific expertise	0	-2	-3
33. Other government agencies should cooperate more with the PCD to achieve its communication goals.	-1	3	-2
34. PCD should create an office with expertise on communication to support the activities of the Bureaus.	1	-3	-1
35. If people make a good argument, PCD should be willing to change a project, programme, or activity.	0	3	1

*Thai translations are available at www.seri-us.org/sites/default/files/35Qs%20for%20PCD_0.pdf

The factor analysis revealed that some individuals contributed significantly to shaping one factor and had minor influence over other factors. Table 2 shows how closely each individual's rank ordering of statements matches those of the three factors – and, thus, how much each individual agrees or disagrees with the perspective represented by a factor. The degree to which an individual's beliefs share features with a factor is represented by 'factor loading scores'. A +1.00 indicates that a participant's rank-ordering of statements exactly matched the factor, a 0 means that there were no similarities at all, and a -1.00 indicates that a participant's rank-ordering was the exact opposite of the factor.

In this study, four individuals did not load significantly on any factor. Three individuals loaded significantly on two factors each, and an additional person loaded on all three factors. An additional individual had only a significant negative loading on one factor (which means significant disagreement with the factor). This suggests that these individuals expressed points of view that are unique and not captured by any of the three 'ideal types' emerging from this solution.

Table 2: Factor Loading Scores for Individuals Completing Q Sorts (N = 28)*

FACTOR A	FACTOR B	FACTOR C	BUREAU
0.7482	0.0747	-0.1638	Air
0.7369	-0.054	0.0877	Waste
0.6842	-0.067	0.1314	Air
0.6451	0.1235	0.2249	Air
0.6278	0.0878	0.4618	Water
0.5407	0.1191	0.4865	Air
0.503	0.1721	0.4236	Air
0.5003	0.4547	0.5085	Waste
0.4177	0.6697	0.2008	Air
-0.3305	0.644	0.2821	Water
0.2958	0.6263	0.06	Water
0.1168	0.5625	0.1983	Air
0.3538	0.5076	-0.1235	Air
-0.0562	0.4934	0.4847	Air
0.1818	0.019	0.7573	Air
-0.0653	-0.4293	0.6865	Air
0.1499	0.2	0.6546	Water
-0.0243	0.3852	0.6262	Water
0.3981	-0.1319	0.5466	Waste
-0.0112	-0.04	0.5041	Air
-0.0785	0.3475	0.503	Water
0.1705	0.4293	0.4836	Water
0.302	0.0178	0.4712	Water
0.0982	-0.6097	0.3749	Waste
-0.1827	-0.0743	0.3198	Water
0.0552	0.3257	0.1595	Waste
-0.1138	-0.1329	0.155	Waste
0.265	-0.069	0.128	Waste

* Variance explained by factor solution is 15 percent for Factor A, 13 percent for Factor B, and 17 percent for Factor C. Bolded factor scores are significant at 95 percent confidence. 0.4360 loading score is 5 percent significance for flagging factor.

Source: Authors' Questionnaire

Perspective 1: PCD risk communication requires resources to reduce conflict

This factor represents a perspective on the role of PCD risk communication to reduce conflict (3).⁶ As the focus is on reducing conflict, the PCD should not take sides – or be perceived as taking sides in disputes (22). Instead it should coordinate with private organisations about the information given to communities in order not to confuse them (12) and use the best available science (23). In some cases, this may mean going beyond what is required by law and regulation in communication activities (9). Furthermore, the PCD should not attempt to mobilise communities to demand better pollution controls and reduction (17) or just focus on community leaders (while ignoring the residents, 29) because both of these could be perceived as taking sides. The PCD does not need to explain what the agency or industry is doing and why they are doing it (10, 11).

To achieve risk communication goals, there is a recognised need for high-level commitment from PCD senior management (16, 30), financial and staff resources (31), and efforts to improve the capacities of PCD staff (18). Those who subscribe to this perspective are ambivalent about the creation of a new office with expertise on risk communication to support the activities of the bureaus (34).

To design its communication activities, the PCD should listen carefully to what people worry about (5) and then use the best science available (23) to help improve understandings and address their worries. There is a sense that local community residents are capable of understanding pollution and risk problems (2). However, it would be wrong to provide any information local residents want (7) because this could lead to confusion (12) if PCD communications goes beyond the facts.

Perspective 2: PCD risk communication should focus on science

The focus of this perspective is on risk communication that improves people's understandings of the science about risks, pollution control, and pollution mitigation (8, 24). In keeping with the focus on science, it is critically important that the information provided to the public should be based on the best available science (23).

An effective way of improving understandings is to explain information about pollution and risk by comparing levels to standards (20) and to tailor communications to

6 In the following, narrative description numbers in parentheses refer to Q statement numbers in Table 1.

the specific local situation (13). This means that the PCD should strive to understand what local people know (6) and if people make a good argument, PCD should be willing to change a project, programme, or activity (35). However, the PCD's mission should also be limited. The communications of the PCD should focus narrowly on pollution levels and risk. Communication activities should not emphasise education of community residents about environmental threats to health (4), should not give them all the information they want (7), and should not mobilise communities to demand better pollution control and reduction (17).

To achieve the goal of improving understandings about pollution risks and mitigation strategies, PCD risk communication programmes should be closely coordinated with other agencies and the private sector (12, 33). The PCD should be careful not to confuse community residents (and leaders) with communication activities (12, 29). While the PCD can always benefit from more scientific expertise, it already has enough 'in house' to ensure effective communications (32) and there is no need at this time to create an office with expertise on communication to support the activities of the bureaus (34).

Perspective 3: PCD risk communication strives to solve environmental health problems

Those who subscribe to this perspective believe that the PCD and local communities should work together to solve environmental problems in the local areas (1). In keeping with the problem-solving mission, PCD should inform communities about what it is doing (10) and tell people how to protect themselves (15). To improve collaboration, the PCD risk communication programmes should be designed to educate people about environmental threats to health (4) in ways that correct misunderstandings (8).

The focus on environmental health means that risk communication activities should go beyond a focus on pollution levels and risk. This means that PCD must often communicate more than what is required by law and regulation (9). In order to determine what information to communicate, PCD communication activities should include activities designed to help the PCD's officials understand what local people know (6), and communication activities should be tailored to the specific local situation (13). However, while attempting to be responsive to questions, comments, and requests from the public (14, 29), the PCD should not just simply give people any information they want (7).

Those who subscribe to this perspective believe that the PCD has the capacity to achieve these goals. Thus, there is no need for PCD to invest more time, money, and staff for successful communication with the public (31), or develop more scientific expertise (32). There is some feeling that the PCD might benefit from a modest investment in gathering information from the public to help scientists and regulators do a better job (19) and in programmes that help PCD officers communicate better with each other (30). This leads to some ambivalence among those subscribing to this perspective about whether the PCD should create an office with expertise on communication to support the activities of the bureaus (34).

Discussion

Before a more detailed discussion of our results is given, it is prudent to point out the limitations of our study. The chief caveat has to do with the generalisability of our findings. Because of the design of our study, it is not possible to generalise from our research participants to the PCD as a whole. In Q methodology, researchers do not select a random sample of the population but instead they use a purposive sampling approach. In this case, our intent was to select people from different bureaus and different organisational levels who have had experience with risk communication activities. We do not know if this is a representative sample of PCD officers. Consequently, we cannot use these findings to draw conclusions about how other people think within PCD. We can, however, make inferences or develop new hypotheses. In addition, our Q method results are premised on the assumption that we sufficiently identified the bulk of diverse perspectives about risk communication. If we missed one or more important perspectives among the research subjects, then our Q results could be incomplete. Another limitation is that the study does not allow conclusions to be drawn about why particular individuals subscribe to these different ideal types. People may subscribe to different perspectives because of their past experiences, the kinds of problems they work on, or other factors (Tuler & Webler, 2010).

While Q studies have, like all research methods, limitations, it is a technique that makes it an appealing approach for investigating subjective attitudes and beliefs on an issue or topic. First, it allows participants to define their own viewpoints. Second,

it is a technique that forces people to prioritise their preferences in a way that is challenging with interviews or focus groups. Third, Q method can clarify areas of agreement and disagreement by putting people's views in the larger context of their overall viewpoint. Fourth, it summarises the many viewpoints held by individuals into a few shared perspectives. Finally, it is appropriate for situations where the number of people involved is small; surveys are not appropriate for small samples.

With these strengths and limitations of the study design in mind, we now turn to four key observations that emerge from our empirical results.

First, the three perspectives were distinguished by many beliefs in common. Important areas of agreement are that:

- PCD should gather information about potential audiences for external communication activities. This can be to learn about their concerns and understandings to both improve PCD activities and to identify areas of misunderstanding.
- It is important to tailor external communication activities to the context of the situation.
- The PCD should use the best available science to provide information in its communication activities.
- The PCD should not provide any information that is requested by local communities, but rather should only provide information for which there is scientific support (statement 7).
- It would be a mistake for the PCD to focus on local leaders, rather than the whole community when it gives out information or asks for input (statement 29).

Second, perspectives emphasise different goals for risk communication. Perspective 1 represents the view that PCD risk communication should be used to reduce conflict (statement 3). Perspective 2 represents a view that PCD should focus risk communication activities on improving people's understandings of the science about risks, pollution control, and pollution mitigation. Finally, Perspective 3 emphasises collaboration to solve pollution problems.

What is not clear is why different goals are emphasised. Two possible explanations are that 1) different respondents are thinking of different kinds of situations or that

2) there is a lack of consensus within PCD about goals of risk communication. As research and practice in Europe and the United States strongly emphasise that risk communication activities should be tailored to specific situations, if respondents' differences result from varying perceptions of the context, then such differences would be appropriate. However, this study does not provide sufficient data to understand the real reason for these differences.

In spite of our caveats above about limitations, the data do suggest – as shown in Table 3 – that preferences for a perspective are not associated with working duration in a particular bureau or organisational level of the officer (senior, medium, or junior). Practitioners and experienced PCD officers may not be surprised to find that people develop very different ideas about goals and mechanisms for communication with external stakeholders. One interesting observation is the relative absence of senior officers associated with Perspective 3, which represents a more problem solving approach (only 1 out of 8). In addition, we gathered data about years of employment in PCD and the number of cases in which an officer was involved with risk communication. The individuals associated with Perspective 3 have worked somewhat fewer years at PCD, however, the significance of this association is not known.

Third, because they emphasise different goals, the three perspectives suggest different content and ways of communicating messages. Perspective 1 emphasises reduction of conflict, and thus it also highlights the need on occasion to go beyond what is required by law and regulation in communication activities. By focusing on improving understandings, Perspective 2 highlights the need for risk communication messages to focus on pollution levels and risk and to use standards as a basis for comparing what is safe versus what is not safe. In contrast to Perspective 2, Perspective 3 wants to provide information that can inform and empower local communities (statement 15), by, for example, educating people about environmental threats to health (statement 4).

Fourth, the perspectives reflect different beliefs about the PCD's capacity for risk communication, the need to invest more commitment and resources to develop capacity, and whether a new office focusing on external communications should be created. Table 4 summarises the viewpoints expressed by each of the perspectives about these matters. Perspective 1 has the highest rankings for all statements about the need for more commitment and

Table 3: Summary of Results

	PERSPECTIVE	1	2	3
Number of individuals loading significantly on factor*		8	7	13
Number from Air Bureau		5	4	5
Number from Water Bureau		1	2	6
Number from Waste Bureau		2	1	2
Average (and median) years worked at PCD		14.75 (16)	14.5 (15)	9.53 (10)
Average (and median) number of projects involving risk communication		16.75** (4.5)	6 (4)	4.46 (3)

* Four individuals loaded on more than one factor. Four individuals did not load significantly on any factor. One individual had only a significant negative loading on one factor (which means significant disagreement with the factor).

** The average for Perspective 1 is skewed because one individual responded with '100+' projects. Eliminating this outlier, the average # of projects involving risk communication is comparable across all three perspectives.

Source: Authors' Questionnaire

resources to develop more capacity. Both Perspectives 2 and 3 represent views that the PCD already has the capacity to design and implement successful risk communications with external stakeholders. It is not surprising then that they also represent a view that there is no need for substantial new resources devoted to helping PCD develop more scientific expertise (about risk communication).

Perspectives 1 and 3 suggest some ambivalence about whether the PCD should create a new office with expertise on risk communication to support the activities of the bureaus (statement 34). Those who subscribe to Perspective 3 have the fewest years working for the PCD and have participated in the fewest number of projects involving risk communication. The problem solving perspective also consists of mainly middle managers and staff. While these associations should be treated with caution, they may suggest that those with less experience believe in a need for more training and support. Perspective 2 is more strongly opposed to the idea of creating a new office, even though it also has the most negative view about the effectiveness of PCD communications with other groups. Perspective 2 also represents the weakest support for having PCD managers who make communication with communities an important priority (statement 16).

Table 4: Suggestions about PCD Capacity for Risk Communication

	FACTOR	A	B	C
<i>Need to develop capacity</i>				
18. The PCD staff should learn to communicate better with community residents.		4	-1	0
19. The PCD should gather information from the public that will help scientists and regulators do a better job.		-1	0	-2
32. The PCD should have more scientific expertise		0	-2	-3
<i>Invest more commitment and resources</i>				
16. The PCD managers should make communication with the community an important priority.		3	0	2
30. A commitment to programmes should be made that help PCD officers communicate better with each other.		2	0	-2
31. PCD should invest the time, money, and staff needed for successful communication with the public.		3	-1	-3
<i>Create new office?</i>				
34. PCD should create an office with expertise on communication to support the activities of the Bureaus.		1	-3	-1

Source: Authors' Questionnaire

Insights and Recommendations About Risk Communication Practice in Thailand

The purpose of this study was to investigate the range of views among PCD officers about 1) the important goals that should be achieved in communication activities with external stakeholders, 2) who the external stakeholders are, and 3) what kinds of information should be provided. This study contributes to a small literature investigating the organisations responsible for risk communication (e.g. Chess & Clarke, 2007; Chess & Johnson, 2006; O'Neill, Calia, Chess, & Clarke, 2007; Shaw & Johnson, 1990; Shen, 2010) and provides insight into the views of agency officers and staff in Thailand about health and environmental risk communication.

We focused on the people responsible for managing and carrying out activities involving risk communication. In the PCD and more widely among Thai government agencies with responsibilities for public and occupational health, there is little explicit focus on risk communication as a core responsibility. Yet, officers and staff

are frequently called upon to be risk communicators and design risk communication activities. They bear the responsibility of determining what is needed in particular contexts to achieve communication goals. Even without explicit rules and procedures, staff and officers are likely to act in ways that are significantly influenced by their job descriptions, organisational incentives, and cultural values and social norms (Chess & Johnson, 2006; O'Neill et al., 2007). In this case we mean cultural values and social norms in both organisational and national contexts. Such values and norms may promote certain behaviours, such as overly reassuring messages that observers identify in Thai crisis communications, which are contrary to guidance about risk communication practice (Lanard & Sandman, 2011). They may also foretell why advice based on European and US experience may go unheeded. For example, advice to apologise and explain past mistakes (as recommended by Lanard & Sandman, 2011) may be difficult for government officers to follow in a culture where saving face and avoiding conflict are important values.

While there are many points of agreement among the respondents, it is also clear that there are some important areas of difference. In particular, officers at all level lack a consensus on the goals of communication activities with external stakeholders. We are not saying, however, that lack of agreement reflects a problem. Rather, it is important to acknowledge that such differences may be a result of different needs in different communication contexts. In fact, many officers believe that risk communication activities should be tailored to specific situations and audiences.

On the other hand, many PCD officers participating in the study have received no training for risk communication, had relatively little experience with risk communication activities, expressed a strong sentiment that more effort should be placed on developing skills and knowledge among officers and staff, agreed that PCD managers should make risk communication an important activity, and believed that PCD communications with the public and NGOs are not as effective as desired.

To improve practice and congruence between agency missions and communication activities, organisations frequently provide managers and staff with training and resources. The results of this study indicate that many PCD officers and staff believe that training for risk communication would be beneficial. However, there has been little effort to investigate the impact of training efforts on the improvement of organisational risk communication capacities.

Although many federal and state agencies have conducted risk communication training, there are no peer-reviewed assessments. Anecdotal reports focus on participant satisfaction, rather than changes in knowledge, let alone changes in agency practice. Thus, despite consultants' promotion of the importance of training, there is no evidence about its value. (Chess, 2011, p. 199)

Effective health and environmental risk communication will continue to be a critical task of government agencies at all levels within Thailand – just as it has emerged within Europe and the United States. Experience has shown that good risk communication can clarify and reduce risk-related disputes, public health risks, and individuals' fears, while poor risk communication can exacerbate them (Foster, Pless-Mulloli, & Busch, 2003; Pidgeon, Henwood, & Maguire, 1999). As government agencies in Thailand seek to develop the capacities for health and environmental risk communication, they will confront many challenges. As this study shows, it cannot be assumed that there will be consensus about goals, perceived needs etc. relating to risk communication within a single bureau, let alone a department/agency. Furthermore, the relevance of existing research from Europe and the United States is unclear within such a different socio-cultural context. Guidance must be tested and developed through experience and systematic learning.

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